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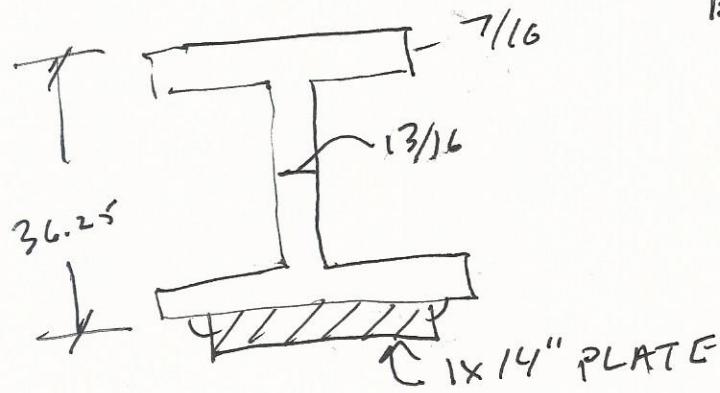
Calculations: 1-12-14

BRF 010-1(43)
ROUTE 9 MARLBORO

2 LANE BRIDGE WITH 4 GIRTERS + WOOD DECK

USED BEAMS FROM I-91 BRIDGE IN LIKE NEW CONDITION.
SPACING IS 5'-0" O.C. - SAME ~~AS~~ AS I-91

BEAMS:



BEAM IS W36X260 WITH
1X14 PLATE

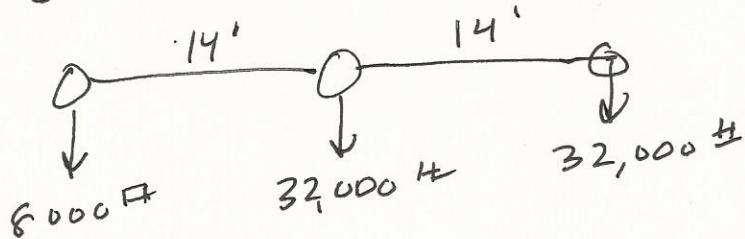
$$A = 90.5 \text{ in}^2$$

$$S_{xy} = 1,317.8 \text{ in}^3$$

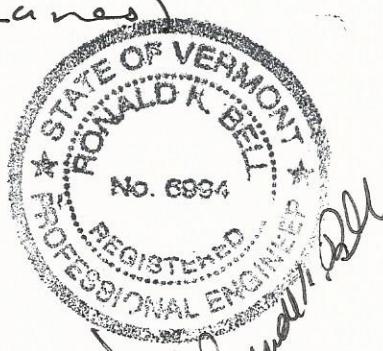
$$I_{xy} = 21,406.4 \text{ in}^4$$

$$Z_p = 1260 \text{ in}^3$$

Design Load = HS20 (Both Lanes)



SPAN = 76' (centerline of Bearings)



Ronald K. Bell

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Distribution Factor for 7.25" Nail Laminated

Deck = $\frac{5}{4.25}$ for 2 Lane Rd.

$$DF = \frac{5}{4.25} = 1.18$$

Distributed Load = $DF \times \text{ONE SET OF WHEELS}$

$$= 1.18 \times 32,000 = 37,760 \text{ lbs}$$

$$1.18 \times 8,000 = 9,440 \text{ lbs}$$

LIVE IMPACT LOAD = $\frac{50}{L+125} = 0.25$

From AASHTO TABLE OF LIVE LOADS THE MOMENT
FOR AN 80' SPAN = 1164.9 KIP FT (CONSERVATIVE)
(ACTUAL SPAN = 76')

FACTORED $M_u = 1164.9 \times 1.18 \times 1.25 = 1718.2 \text{ KIP FT}$

DEAD LOAD FOR NAIL LAMINATED DECK, PAVEMENT
+ RAILING = $80 \text{ lbs/ft} \times 5' = 400 \text{ #/ft}$

$$M_d = \frac{(400 \text{ #/ft})(76)^2}{(8)(1000)} = 288.8 \text{ KIP FT}$$

LOAD FACTOR DESIGN :

For GROUP I (Comb. of Dead, LIVE + IMPACT)
THE FACTORED moment is:



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$$M_F = \Gamma (B_D D) + B_L (L + I)$$

$\Gamma = 1.3$ FOR LOAD FACTOR

1.0 FOR FLEXURAL TENSION MEMBER

1.67 FOR LIVE LOAD + IMPACT FOR HS LOADING

$$M_F = (1.3)(1.67)(288.8) + 1.67(1718.2)$$

$$= 3,244.8 \text{ KIP FT}$$

$$M_u = F_y Z_p = \frac{36 \frac{\text{KIPS}}{(\text{IN})^2} \times 1260 \cdot \text{in}^3}{12 \text{ in}/\text{ft}}$$

$$= 3,780 \text{ KIP FT}$$

$$M_u > M_F \text{ } 60\% \text{ OK}$$

CHECK SHEAR @ SUPPORTS

$$V_p = \frac{w_p L}{2} = \frac{(400 \text{ #/ft})(76'')}{2} = 15,200 \text{ #S}$$

FROM AASHTO TABLE FOR HS20 FOR 80' SPAN $V_i = 63.6$

$$\text{THE FACTORS } V_{L+I} = (63.6)(1.18)(1.25) = 93.81 \text{ KIPS}$$

$$V_F = (1.3)(1.0)(15.2) + (1.67)(93.81)$$

$$= 176.5 \text{ KIPS}$$



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$$V_u = 0.58 F_y D t_w \quad (\text{AASHTO LRFD 10.48.8.1})$$

$$= (.58)(36 \frac{\text{kips}}{\text{in}^2})(36.25)(0.81)$$

$$= 613.1 \text{ kips}$$

$$V_u > V_{F_D} \text{ OK}$$

